

ABSTRACT OF THE INVENTION

A process for treating wastewater and a system for practicing the process includes: providing a plurality of zones within a single vessel wastewater treatment system; feeding wastewater into the system; maintaining an aerobic zone in the upper central portion of the vessel; feeding air into the aerobic zone for oxygenation and creating an upflow; maintaining an annularly disposed anoxic zone about said aerobic zone; causing the upflow from the aerobic zone to produce a downflow in the anoxic zone; causing at least a portion of the downflow from the anoxic zone to pass into the upflow of the aerobic zone; maintaining an annularly disposed clarification zone about said anoxic zone for clarified liquid, including an upflow; causing at least a portion of the downflow from the anoxic zone to pass into the upflow of the clarification zone; maintaining a facultative transition zone below the upper aerobic, anoxic and clarification zones; maintaining an anaerobic zone below the facultative zone for absorbing solids settled by gravity and synthesizing volatile fatty acids; withdrawing substantially clarified liquid from the upflow of the clarification zone; withdrawing substantially solids from about the bottom of the anaerobic zone; employing the aerobic zone for breaking down carbon chains and oxidizing volatile fatty acids dispersed from the anaerobic zone; interacting the aerobic and anoxic zones for the removal of nitrates; and interacting the aerobic, anaerobic and anoxic zones for the removal of phosphorus.